WHAT IS CLAIMED:

1. A method of preparing semiconductor wafers for measurement in a metrology tool comprising the steps of:

a) heating the wafer by conduction for a predetermined time period to remove contaminants from the wafer surface;

b) cooling the wafer by conduction for a predetermined time; and

c) measuring characteristics of the wafer with the metrology tool a predetermined time after the cooling step is completed.

2. A method as recited in claim 1, wherein steps (a) (b) and (c) are repeated for a plurality of wafers.

3. A method of preparing semiconductor wafers for measurement in a metrology tool comprising the steps of:

a) loading a wafer onto a planar heater element;

b) heating the wafer by conduction for a predetermined amount of time to remove contaminants from the wafer surface;

c) removing the wafer from the heater element;

d) loading the wafer onto a planar cooling element thermally isolated from the heater element;

e) cooling the wafer for a predetermined amount of time;

f) removing the wafer from the cooling element and loading the wafer in the metrology tool;

h) measuring characteristics of the wafer with the metrology tool.

4. A method as recited in claim 3, wherein steps (a) through (h) are repeated for a plurality of wafers.

5. A method as recited in claim 4, wherein the predetermined heating time is the same for the plurality of wafers.

6. A method as recited in claim 4, wherein the predetermined cooling time is the same for the plurality of wafers.

7. A method as recited in claim 4, wherein the time between the end of cooling step and the beginning of the measurement step is the same for the plurality of wafers.

8. A method as recited in claim 4, wherein the time between the end of the heating step and the beginning of the cooling step is the same for the plurality of wafers.

9. A method as recited in claim 4, wherein:

the predetermined heating time is the same for the plurality of wafers;

the predetermined cooling time is the same for the plurality of wafers;

the time between the end of the heating step and the beginning of the cooling step is the same for the plurality of wafer; and

the time between the end of cooling step and the beginning of the measurement step is the same for the plurality of wafers.

10. An apparatus for treating samples comprising:

a heating station including a planar heater element for heating the sample by conduction in order to reduce contaminants thereon; and

a cooling station thermally isolated from the heating station and including a planar cooling element for cooling the sample by conduction.

11. An apparatus as recited in claim 10, wherein said planar heater element is defined by a dielectric plate having a layer of resistive material in contact with the underside thereof, said resistive material being connected to a power source for generating heat in the resistive material which is transferred to the sample wafer through the plate.

12. An apparatus as recited in claim 10, wherein said planar heater element includes a plurality of vertical channels, said heating station further including a plurality of lift pins, movable between upper and lower positions and receivable in said channels of said heater element and arranged such that when said pins are in the upper position, said pins project above the planar surface of the heater element in a manner to support the sample above the heater element to facilitate loading and unloading of the sample and wherein when said pins are in the lower position, the sample is brought into contact with the heater element.

13. An apparatus as recited in claim 10, further including a vacuum system for holding the sample tightly against the heater element while the sample is being heated.

14. An apparatus as recited in claim 14, wherein said heater element includes a groove formed in the upper surface thereof, said groove being coupled to the vacuum system.

15. An apparatus as recited in claim 14, further including a robotic arm for inserting the sample into the heating station and onto the pins when the pins are in the upper position.

16. An apparatus as recited in claim 10, further including a processor, said processor for controlling the heating and cooling cycles so that the measurements will be repeatable.

17. An apparatus as recited in claim 10, further including a metrology tool for measuring the sample after the sample has been cooled.

18. An apparatus as recited in claim 17, wherein said processor controls the time period between the end of the cooling cycle and the beginning of the measurement cycle so that the measurements will be repeatable.

19. An apparatus as recited in claim 10, wherein said heating station is enclosed by a chamber.

20. An apparatus as recited in claim 19, wherein the outer surface of said heating chamber is water-cooled to limit heat flow into the environment.

21 An apparatus as recited in claim 19, wherein said heating chamber includes a gas flow system to facilitate removal of contaminants from the sample.

22. An apparatus as recited in claim 19, further including a sensor for monitoring the temperature of the heating chamber.

23. An apparatus as recited in claim 22, further including a processor for receiving signals from said sensor and for automatically disabling the heating station if the temperature becomes too high.

24. An apparatus as recited in claim 10, wherein said planar cooling element is water-cooled.